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IS 7402 (2011): Ceramic Water Purifier Filter Candles - Specification [CHD 9: Ceramicware]

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(दूसरा पुनरीक्षण)

Indian Standard

CERAMIC WATER PURIFIER FILTER CANDLES — SPECIFICATION

(Second Revision)

ICS 81.060.20

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

December 2011 **Price Group 3**

Ceramicware Sectional Committee, CHD 9

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Ceramicware Sectional Committee had been approved by the Chemical Division Council.

This standard was originally published in two parts, Part 1 covering filter containers, and Part 2 covering filter candles. The filter candles prescribed in Part 2 covered two types of filter candles, namely, Type 1 meant for filtration of suspended matter or sediment, and Type 2 meant for water filtration to free it from bacteria also. In the first revision, both parts were amalgamated with a change in title as filters for drinking water purposes. Further, the design, pattern, material and dimension of containers and filter candles were kept open and filter candle covered by Type 1 of the original standard was deleted to give better protection to consumers.

The Committee responsible for the formulation of this standard decided to revise it further deleting few clauses of the first revision of the standard. In this revision, title of the standard has been changed and test method for rate of filtration has also been modified. A typical procedure for cleaning and maintenance of filter candles is incorporated for guidance. Requirement for containers also deleted since this subject is not within the scope of the Committee. Changes made in the first revision of the standard through various amendments have also been amalgamated in this standard.

The composition of the Committee responsible for formulation of this standard is given in Annex F.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’.

Indian Standard
CERAMIC WATER PURIFIER FILTER CANDLES — SPECIFICATION
(Second Revision)

1 SCOPE

This standard prescribes the requirements and methods of sampling and test for ceramic water purifier filter candles.

2 REFERENCES

The standards listed below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
264 : 2005	Nitric acid — Specification (*third revision*)
265 : 1993	Hydrochloric acid — Specification (*fourth revision*)
799 : 1985	Specification for ammonia, liquor (*second revision*)
2781 : 2004	Glossary of terms relating to ceramicware (*second revision*)
3025 (Part 10) : 1984	Methods of sampling and test (physical and chemical) for water and waste water: Part 10 Turbidity (*first revision*)
4905 : 1968	Methods for random sampling
5887 (Part 1) : 1976	Methods for detection of bacteria responsible for food poisoning: Part 1 Isolation, identification and enumeration of *Escherichia Coli* (*first revision*)

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 2781 shall apply.

4 MATERIAL

4.1 Ceramic candles shall be fired, unglazed porous earthenware and subsequently suitably treated chemically so that fine silver is embedded in the body of the ceramic candle.

4.2 Brush

The manufacturer shall provide a suitable non-metallic brush for cleaning the ceramic candles. Brush shall be of food grade material.

5 REQUIREMENTS

5.1 Dimensions

Ceramic candles shall be of such a shape and size as agreed to between the purchaser and the supplier. However, a typical pattern and dimensions for ceramic candle are given in Fig. 1 for guidance.

5.1.1 Tolerance on all dimensions of ceramic portions shall be ±2 mm on the declared values.

5.2 Workmanship and Finish

Ceramic candle shall be regular in shape, symmetrical about their axis and properly fired so as not to shed particles under conditions of normal use. It shall also be free from large discrete cavities, warpage, uneven firing, protrusion and inadequate sealing. It shall have no visible cracks when seen from a distance of around 30 cm. It shall also pass the test for detection of cracks and inadequate sealing when tested by the method prescribed in Annex A.

5.3 Rate of Filtration

When tested with the standard turbid water of 20 to 25 NTU by the method prescribed in Annex B, it shall be at least 1.0 litre per hour per candle and turbidity of the filtered water shall not be more than 3.0 NTU [*see* IS 3025 (Part 10)].

NOTE — This test shall be carried out once in six months.

5.4 Freedom from Suspended Particles

The filter candle shall pass the test for freedom from suspended particles when the filtered water taken (*see* **5.3**) in a clear 250 ml beaker made of colourless glass, shall not show any suspended particles when examined visually from a distance of 30 to 35 cm.

NOTE — This test shall be carried out once in six months.

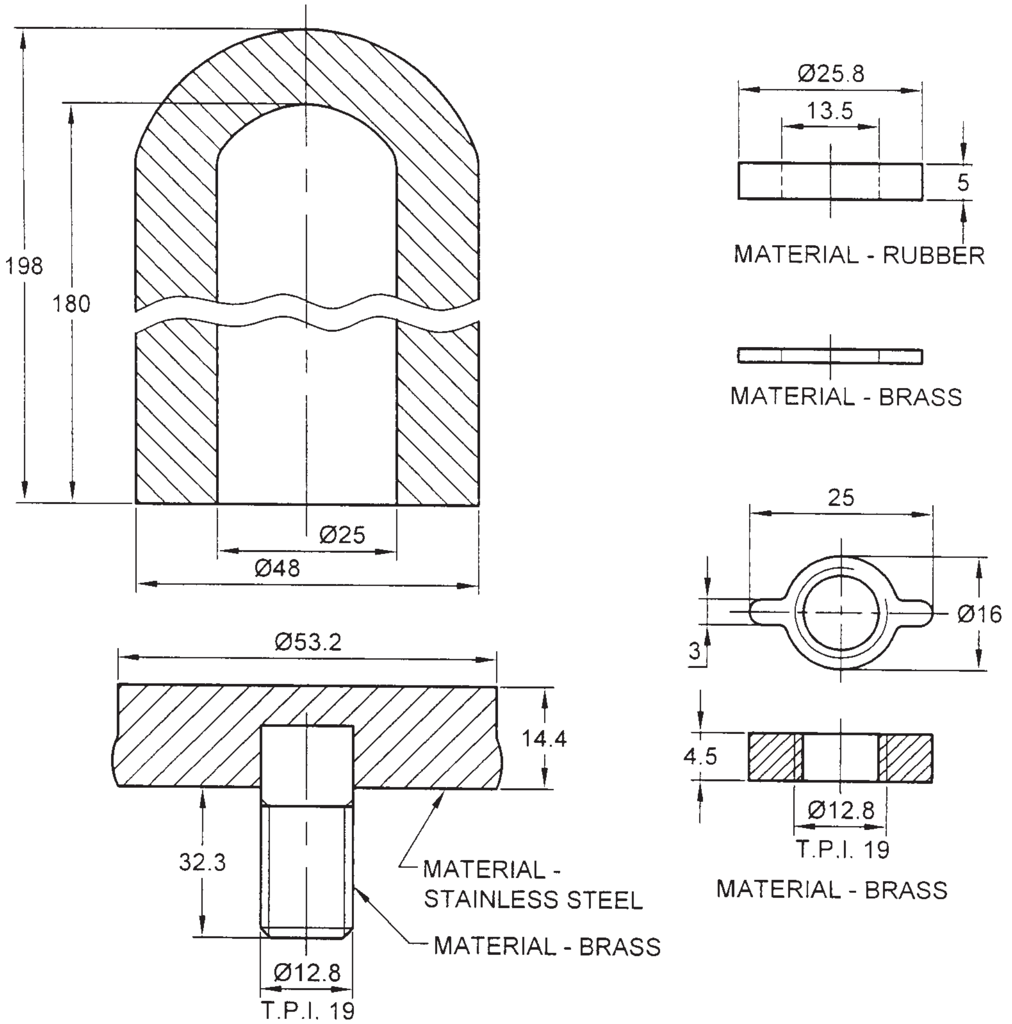

FIG. 1 CERAMIC CANDLE

5.5 Presence of Silver

When tested by the method prescribed in Annex C, the test shall indicate the presence of silver.

NOTE — This test shall be carried out once in six months.

5.6 Freedom from Bacteria

Filter candles shall pass the test for freedom from bacteria when tested by the procedure given in **5.6.1**.

5.6.1 Prepare a suspension of *Escherichia coli* (10^5 organisms/ml) and fill into a sterilized filter container fitted with the filter candle under test and collect the filtrate in a sterilized vessel. Test the filtrate for the presence of *E coli* as prescribed in **4**, **5** and **6** of IS 5887 (Part 1).

NOTE — This test shall be carried out once in six months.

5.7 Filter Cap and Other Accessories

The material used in the manufacture of filter cap shall be stainless steel, polypropylene or brass coated with nickel and shall be of food grade material. It shall be jointed to the ceramic candle by portland or any hydraulic cement or any other suitable binding material. Jointing material, that is, sealing of filter cap, metallic/rubber washers and metallic/non-metallic nut shall be of food grade material.

6 PACKING AND MARKING

6.1 Packing

The ceramic candles shall be packed as agreed to between the purchaser and the supplier.

6.2 Marking

The ceramic candles shall be marked with the following information:

a) Manufacturer's name and his recognized trade-mark, if any;
b) Rate of filtration; and
c) Lot number or batch number to enable the batch to be traced from records.

6.2.1 In addition, the manufacturer shall provide an information leaflet covering the volume of filtered water after which brushing is necessary and prescribing the time limit after which the ceramic candle is to be changed. A typical procedure for cleaning and maintenance of filter candles is given in Annex D for guidance.

6.2.2 *BIS Certification Marking*

The ceramic candles may also be marked with the Standard Mark.

6.2.2.1 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

7 SAMPLING AND CRITERIA FOR CONFORMITY

The sampling procedure and the criteria for conformity shall be as given in Annex E.

ANNEX A

(*Clause* 5.2)

TEST FOR DETECTION OF INADEQUATE SEALING

A-1 APPARATUS

A suitable apparatus is shown in Fig. 2.

A-2 PROCEDURE

A-2.1 Thoroughly clean the ceramic candle under test. Draw a line parallel to the axis so that the candle is divided into halves representing two distinct faces *A* and *B* of the candle. Soak the ceramic candle for sufficient time (say 30 min) in distilled water. Connect the soaked ceramic candle to a controllable source of clean, compressed air (*see* Fig. 2). Immerse the ceramic candle just below the surface of distilled water with face *A* upwards and gradually increase the air pressure by operating the pressure controller until the bubbles passes through the ceramic candle and rises through the water. Observe the leakage at the joint point of the filter cap and the ceramic candle. If there is no leakage from the joint point of the filter cap and the ceramic candle, it indicates adequate sealing. Repeat the same with face *B* upward.

A-2.2 The material shall be deemed to have passed the test, if there is no bubble at the joint point of filter cap and the ceramic candle and also no concentration of bubbles at any area (dia 4 mm or more) in the body of the candle.

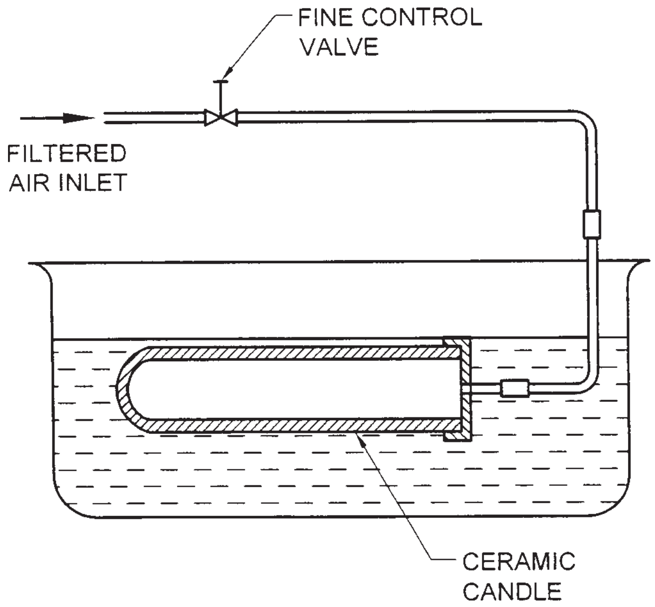

FIG. 2 APPARATUS FOR DETERMINATION OF HIDDEN CRACKS OR LARGE DISCRETE CAVITIES

ANNEX B

(*Clause* 5.3)

DETERMINATION OF RATE OF FILTRATION

B-1 APPARATUS AND REAGENTS

B-1.1 Upper Container — 8 litre capacity with a hole at the centre to hold the ceramic candle.

B-1.2 Lower Container — 8 litre capacity.

B-1.3 Turbiditimeter — It shall consist of a nephelometer with a light source for illuminating the sample and one or more photoelectric detectors with a read out device to indicate the intensity of light scattered at right angle to the path of the incident light. The turbidimeter should be so designed that little stray light reaches the detector in the absence of turbidity and should be free from significant drift after a short warm-up period.

B-1.4 Measuring Scale

B-1.5 Measuring Cylinder

B-1.6 Turbid Water — 20 to 25 NTU.

B-2 PROCEDURE

B-2.1 Preparation of (20 to 25 NTU) Standard Turbid Water

Prepare hydrazine sulphate solution by taking 5.0 g hydrazine sulphate reagent grade and dissolve in 400 ml distilled water. Prepare hexamethylene tetramine solution by taking 50.0 g hexamethylene tetramine and dissolve in 400 ml distilled water. Mix hydrazine sulphate solution and hexamethylene tetramine solution and make it up to 1 000 ml by adding distilled water and allow this mixture to settle for 24 h at 27 ± 2°C. This is the stock solution of 4 000 NTU formazine. This is stable for one month. This solution may be diluted appropriately with distilled water to prepare turbid water of 20 to 25 NTU. The stock solution may be diluted in steps with clean pipettes or burettes into volumetric glassware to get higher accuracy.

B-2.2 Thoroughly clean and dry the ceramic candle under test. Fix the ceramic candle in the holder in the upper chamber of the container. Fill the container with turbid water of 20 to 25 NTU so that entire candle is immersed in water. Maintain the water level in such a way that the candle always remains immersed in the water. It shall be ensured that there is no leakage from the body or inadequate sealing of the candle into the holder of the filter or cap. Allow the ceramic candle to remain immersed in water for filtration for a minimum period of 12 h and reject the filtered water obtained in the lower chamber. During this period the entire entrapped air in the capillary channel is removed.

B-2.3 Mark the water level at a height of 5 cm above the candle and maintain it at this level throughout the test. Note the time at the start of collection of water in the lower chamber of the filter. After an interval of 1 h remove the upper chamber and measure the volume of water collected in the lower chamber.

ANNEX C

(*Clause* 5.5)

METHOD OF TEST FOR PRESENCE OF SILVER

C-l PREPARATION OF SAMPLE

Break ceramic candle and take sufficient quantity of pieces in agated pestle and mortar and grind it to fine powder to give more than 5 g of powder.

C-2 REAGENTS

C-2.1 Dilute Nitric Acid 50 Percent (*v*/*v*) — See IS 264.

C-2.2 Dilute Hydrochloric Acid 35 Percent (*v*/*v*) — See IS 265.

C-2.3 Liquor Ammonia — See IS 799.

C-3 PROCEDURE

Take 5 g of finely agated ceramic candle material, wash with distilled water, allow to settle the mixture and decant the supernatant and wash out at least thrice and decant the supernatant liquid. Digest the residue with 50 ml of dilute nitric acid on a hot plate and allow to settle. Decant the supernatant liquid into a suitable glass tube. Add into the glass tube a few ml of dilute HCl. If solution shows white turbidity, confirm presence of silver by adding an excess of liquid ammonia, when the turbidity will disappear.

ANNEX D

(*Clause* 6.2.1)

CLEANING AND MAINTENANCE OF FILTER CANDLES

D-l Clean the filter candle at regular intervals depending on impurities in water for constant flow rate. Non-cleaning may lead to choking of fine pores of filter candle resulting in hardening of surface and eventual reduction or total stoppage of water flow. In such case, it will not be possible to clean the filter candle and use again.

D-2 Clean the filter candle at least once a week with a soft brush for efficient filtration. Hold the candle and gently brush under running water from a tap until all dirt is removed and the original colour of candle is restored.

D-3 Replace the filter candle with a new one when there are signs of wear and tear due to periodic cleaning. Replacement of filter candle after twelve months of use or earlier is recommended.

D-4 Potash alum may be used to increase life of filter candle. Stir alum in a bucketful of water and allow the suspended impurities to settle down at the bottom. Now pass on the clear water from top through the filter candle to avoid settling of impurities on the body of the candle.

D-5 Do not be alarmed, if greyish spots appear on the filter candle. It is a natural phenomenon of silver present in filter candle.

ANNEX E

(*Clause* 7)

SAMPLING AND CRITERIA FOR CONFORMITY

E-1 LOT

E-1.1 In a consignment all the ceramic candles, manufactured from the same type of material and belonging to the same batch of manufacture shall be grouped together to constitute a lot. Each lot shall be tested for conformity to the requirements of this standard.

E-1.2 Each lot shall be tested for conformity to the requirements of workmanship and finish, dimensions and filter cap of this standard.

E-1.3 Requirements for rate of filtration, freedom from bacteria, presence of silver and freedom from suspended particles shall be tested once in six months.

E-2 SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

E-2.1 The number of ceramic candles to be sampled from each lot depends on the size of the lot and shall be as given in co1 2 and col 3 of Table 1. These ceramic candles shall be selected at random making use of random number tables. For random selection procedures, reference may be made to IS 4905.

E-2.2 Workmanship and Finish, Dimensions and Filter Cap

The number of ceramic candles be sampled for examining the above characteristics is given in co1 3 of Table 1. Any ceramic candles failing in one or more of the tests shall be termed defective. The number of defective ceramic candles shall not exceed the acceptance number (*see* co1 4 of Table 1), if the lot is to be accepted under this clause.

E-2.3 Tests for Rate of Filtration, Freedom from Bacteria, Presence of Silver and Freedom from Suspended Particles

These tests shall be carried out once in six months. The number of tests to be conducted for each of the above properties is given in co1 5 of Table 1. For conducting these tests, sample test pieces shall be obtained from sample ceramic candles as described in respective test methods. No failures shall occur, if the lot is to be declared satisfactory under this clause.

Table 1 Scale of Sampling and Criteria for Conformity

(*Clauses* E-2.1, E-2.2 *and* E-2.3)

Sl No.	Lot Size	Sample Size for Visual and Dimensional Tests (*see* 5.1, 5.1.1, 5.2 and 5.7)	Acceptance No.	No. of Tests for Each Property (*see* 5.3 to 5.6)
(1)	(2)	(3)	(4)	(5)
i)	Up to 25	3	0	1
ii)	26-50	5	0	1
iii)	51-100	8	1	2
iv)	101-200	13	1	3
v)	201 and above	20	2	4

ANNEX F
(*Foreword*)

COMMITTEE COMPOSITION

Ceramicware Sectional Committee, CHD 9

Organization	*Representative(s)*
Central Glass & Ceramic Research Institute, Khurja	Dr L. K. Sharma (***Chairman***)
Central Glass & Ceramic Research Institute, Kolkata	Representative
Cera Sanitaryware Ltd, Kadi	Shri M. K. Bhandari Shri V. K. Jain (*Alternate*)
Chemicals & Allied Products Export Inspection Council, Kolkata	Shri S. K. Ghosh Shri K. K. Bhatia (*Alternate*)
Controller of Quality Assurance, Kanpur	Shri S. K. Srivastava Shri Girish Trivedi (*Alternate*)
Export Inspection Council of India, New Delhi	Shri Karam Chand Shri B. Bahadur (*Alternate*)
Hindustan Unilever Research Centre, Mumbai	Dr Nimish Shah Dr J. Chatterjee (*Alternate*)
Hindustan Sanitaryware and Industries Ltd, Bahadurgarh	Shri R. K. Somany Shri Sandeep Somany (*Alternate*)
Hotel and Resturants Association of India, New Delhi	Shrimati Malini Rajendran
Indian Institute of Technology, Delhi	Dr (Shrimati) Veena Choudhary
Industries Commissioner, Gandhinagar	Shri R. J. Shah
Khurja Pottery Manufacturers' Association, Khurja	Shri Narendra Yadav Shri Tanmay (*Alternate*)
Morbi Dhuba Glaze Tiles Association, Morbi	Shri Girishbhai Pethapara Shri Rajubhai Patel (*Alternate*)
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BIS Directorate General	Shri E. Devendar, Scientist 'F' and Head (CHD) [Representing Director General (*Ex-officio*)]

Member Secretary

Shri S. N. Chatterjee
Scientist 'E' (CHD), BIS

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Amendments Issued Since Publication

Amendment No.	Date of Issue	Text Affected

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